06-12-00

A

LIMBACH & LIMBACH L.L.P.
2001 Ferry Building, San Francisco, CA 94111
415/433-4150

Address to:
Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

Attorney's Docket No. IHE-310-USA
[]
First Named Inventor IHAB H. ELZIND

UTILITY PATENT APPLICATION TRANSMITTAL
(under 37 CFR 1.53(b))

SIR:

Transmitted herewith for filing is the patent application entitled:
CELLULAR INTERNET PROTOCOL MODEM NETWORK

CERTIFICATION UNDER 37 CFR § 1.10

I hereby certify that this New Application and the documents referred to as enclosed herein are being deposited with the United States Postal Service on this date June 8, 2000, in an envelope bearing "Express Mail Post Office To Addressee" Mailing Label Number EL186212413US addressed to: Box Patent Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

Melinda R. Rodriguez
(Name of person mailing paper)

(Signature)

Enclosed are:

1. X Transmittal Form (two copies required)

2. The papers required for filing date under CFR § 1.53(b):
   i. 10 Pages of specification (including claims and abstract);
   ii. 9 Sheets of drawings.
   x formal __ informal

3. Declaration or oath

   a. x Newly executed (original or copy)

4. __ Microfiche Computer Program (Appendix, see 37 CFR 1.96)

5. __ Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
   i. __ Computer Readable Copy
   ii. __ Paper Copy (identical to computer copy)
   iii. __ Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

6. __ An assignment of the invention to is attached (including Form PTO-1595).

   i. __ 37 CFR 3.73(b) Statement (when there is an assignee)

7. x Power of Attorney

8. x An Information Disclosure Statement (IDS) is enclosed, including a PTO-1449 and copies of 7 references.

9. __ Preliminary Amendment.

10. X Return Receipt Postcard (MPEP 503 -- should be specifically itemized)

11. __ Other

12. FOREIGN PRIORITY
[x] Priority of application No. PCT/US99/17793 filed on August 6, 1999 is claimed under 35 USC § 365(c).

13. PROVISIONAL APPLICATION PRIORITY

X Priority of application No. 60/095,720, filed on August 7, 1998 and No. 60/140,717, filed on June 22, 1999 is claimed under 35 U.S.C. § 119(e).

14. **FEE CALCULATION**

a. __ Amendment changing number of claims or deleting multiple dependencies is enclosed.

CLAIMS AS FILED

	Number Filed	Number Extra	Rate	Basic Fee ($690)
Total Claims	17 - 20	* 0	x $18.00	
Independent Claims	4 - 3	* 1	x $78.00	78.00
__ Multiple dependent claim(s), if any			$260.00	

*If less than zero, enter "0".

Filing Fee Calculation $768.00

50% Filing Fee Reduction (if applicable) $384.00

15. Small Entity Status
a. X A small entity statement is enclosed.
b. __ A small entity statement was filed in the prior nonprovisional application and such status is still proper and desired.
c. __ is no longer claimed.

16. Other Fees
__ Recording Assignment [$40.00] . . . . . $
__ Other fees
Specify _____ . . . . . $

Total Fees Enclosed $384.00

17. Payment of Fees
X Check(s) in the amount of $ 384.00 enclosed.
__ Charge Account No. 12-1420 in the amount of $__.
A duplicate of this transmittal is attached.

18. All correspondence regarding this application should be forwarded to the undersigned attorney:

George C. Limbach
Limbach & Limbach L.L.P.
2001 Ferry Building
San Francisco, CA 94111
Telephone: 415/433-4150
Facsimile: 415/433-8716

19. Authorization to Charge Additional Fees

X The Commissioner is hereby authorized to charge any additional fees (or credit any overpayment) associated with this communication and which may be required under 37 CFR § 1.16 or § 1.17 to Account No. 12-1420. **A duplicate of this transmittal is attached.**

LIMBACH & LIMBACH L.L.P.

June 8, 2000
(Date)

By: G. C. Limbach
George C. Limbach
Registration No. 19,305
Attorney(s) or Agent(s) of Record

Attorney Docket No. IHE-310-USA

Applicant or Patentee: IHAB H. ELZIND
Appln. or Patent No.:
Filed or Issued: HEREWITH
For: CELLULAR INTERNET PROTOCOL MODEM NETWORK

Attorney Docket No.: IHE-310USA

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, to the Patent and Trademark Office with regard to the invention entitled CELLULAR INTERNET PROTOCOL MODEM NETWORK described in

[X] the specification filed herewith with title as listed above.
[] application no. , filed .
[] patent no. , issued .

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

[X] no such person, concern, or organization
[] persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27).

FULL NAME _____
ADDRESS _____
[ ] Individual [ ] Small Business Concern [ ] Nonprofit Organization

FULL NAME _____
ADDRESS _____
[ ] Individual [ ] Small Business Concern [ ] Nonprofit Organization

FULL NAME _____
ADDRESS _____
[ ] Individual [ ] Small Business Concern [ ] Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time or paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Ihab H. Elzind		
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Signature	Signature	Signature
6-3-00		
Date	Date	Date

CELLULAR INTERNET PROTOCOL MODEM NETWORK

BACKGROUND OF THE INVENTION

Field of Invention

The present invention relates to cellular wireless data communications. In particular, the invention relates to cellular communications using a unique Protocol called Cellular IP as well as the network architecture for it.

Description of the Related Art

FIG. 1 shows an existing cellular data network 50. The Internet Service Provider (ISP) 55 or service provider in general provides the connectivity of Internet traffic for various user stations 50, 57 and 58. The base station 55 creates the cell 49, creating cellular service. That is, user stations 50, 57 and 58 are within cell 49 and are served by base station 55. The base station 55 connects the user stations 50 and 58 to the ISP 55 via a wireless link.

However, user station 66 may be outside the range of the base station 55, or may be within range but does not have line of sight because of obstruction by buildings such as station 57 obstructed by building 56. Therefore, user stations 57 and 66 cannot connect to the ISP 55.

A conventional solution is to build another base station or repeater to service user stations 57 and 66. However, this may involve significant expenditures in cost and equipment. There is a need for a more cost-effective way of providing service to user stations 57 and 66.

SUMMARY OF THE INVENTION

The present invention addresses these and other problems of the prior art by providing a Cellular Internet Protocol (CIP) system.

According to one embodiment, an apparatus according to the present invention is a cellular IP modem that includes a baseband-to-intermediate frequency unit and a radio frequency unit. The baseband-to-intermediate frequency unit is configured to have a routing engine based on Cellular Internet Protocol.

According to another embodiment, a method according to the present invention includes the steps of sending a data packet including routing information indicating an intermediate recipient other than a base station; receiving the packet at the intermediate

recipient; and sending the packet in accordance with the routing information from the intermediate recipient to the base station.

According to another embodiment, a network architecture is described to support the creation of the Cellular IP network and its elements.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of an existing cellular network.

FIG. 2 is a block diagram of a Cellular IP packet according to the present invention.

FIG. MM-1 is a block diagram of the new Cellular IP network and its elements.

FIG. MM-2 is a block diagram of a user station that does not have line of sight because of obstruction according to the present invention.

FIG. MM-3 is a block diagram of an end user setup.

FIG. MM-4 is a block diagram of the base station setup and elements.

FIG. MM-5 is a description of how the frequency planning is done with respect to time.

FIG. 3 is an embodiment of a frequency table used to generate a coded spectrum.

FIG. 4 is an embodiment of the bit stream modulation according to the present invention.

FIG. 5 is an embodiment of the RF section according to the present invention.

FIG. 6 is an embodiment of the demodulation according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 2 shows a frame format for a Cellular IP packet. The packet may be a variable-length packet with a maximum of 512 bytes. The packet may include a seven byte preamble, a one byte start-of-frame delimiter (SFD), a nine byte destination address (DA), a nine byte source address (SA), a 110 byte routing information block (RIB), a six byte type field, a six byte status field, a 360 byte data field and a four byte cyclic redundancy check (CRC) field.

The preamble contains alternating 1s and 0s for determination of a collision and establishing synchronization.

The SFD may have a value of <A5>h to indicate the beginning of the frame.

The DA may have one byte for indicating a region, such as the location within a country of the recipient user station. Eight bits give 256 (28) regions. Two bytes may be used to indicate the cell identifier within the region. Sixteen bits give 65,536 (216) cells. Six bytes indicate the Cellular IP address of the recipient user station within the cell.

The SA has fields similar to that of the DA but for indicating the sending user station instead of the recipient user station.

The RIB indicates the path that the packet should take from the ending user station to the base station. With a maximum of 110 bytes, the RIB can specify up to ten links in the route from the sending user station to the base station.

The frame type field indicates whether the packet is a control packet or a service packet. Specifically, their first two bytes indicate the protocol, the second two indicate the subprotocol, and the last two indicate the service. For example, if the first two bytes are <7777>h and the second two bytes are <0707>h, this indicates an "upgrade firmware" instruction with the third two bytes setting various flags. As another example, if the first two bytes are <0800>h, this indicates that the second two bytes will indicate "tcp/udp" and the third two bytes indicate the "service port number" (e.g., email is port 25, http is port 80 and ftp is port 20). Other subprotocols of Cellular IP include route discovery protocol, echo protocol and remote configuration protocol.

The status field may indicate information such as whether the packet is an ACK or a NACK packet, the number of data packets pending, spread spectrum synchronization information, or whether the packet is native or routed. The data field may include up to 360 bytes of data. The CRC field includes error detection or correction information.

Routing Features

FIG. MM-2 illustrates the routing features of a Cellular IP network 100. The ISP 102 provides the switching of Internet traffic for various user stations 104 and 106. Other base stations define cells 112 and 114, respectively, of cellular service. That is, user station 104 is cell 100 and is served by base station 102, and so on. The modems in cells 104 and 106 connect to the ISP 102.

User station labeled HOME A is outside of cell 100, either because it is out of range or because it is within range but obstructed by buildings such as 107 or any other obstruction. In such an event, user station HOME A uses a routing table to construct a RIB indicating a suitable communications link.

The routing table may be static or dynamic. In static routing, the routing table is defined when the Cellular IP modem is first installed. The user station 116 has a routing table containing information indicating that user station HOME A may connect to the modem in HOME B which has coverage from the base station 102, among any other routing information. A number of additional routes is possible for additional redundancy in case HOME B is out of service.

Network Architecture Features

The network architecture is slotted collision sensing multiple architecture with carrier detect (CSMA/CD) where the entire bandwidth is shared between all the users. The Cellular IP may be implemented in a spread spectrum with frequency hopping. For example, each cell may be configured to broadcast in 100 time slots (or equivalently, 100 frequency hops). That is, there are 100 transmission hops each second. Each user station and base station in the cell is configured with a starting hop number. The starting hop number is the number of the hop where any user modem can start transmitting packets until it is finished and while it is transmitting other users wait until it is finished even if it utilizes their hop slot. The advantage of this is since each modem starts at its own hop number, as long as no other modems are transmitting, it further reduces collisions between modems. For example, if the probability of collision in a CSMA/CD network where the modems can start transmitting at any random time is x and if this scheme of assigning a time reference "hop in this case" of 100 hops, this further reduces collisions by a factor of x/100. The hop number is either set at installation time or may be configured for each station via the ISP Base station.

This method minimizes collisions because each station listens to the current transmissions to determine if its starting hop number will be available. If it will be available, then the station begins a transmission on its starting hop number. If not, then the station waits. This reduces collisions because a collision only occurs when two conditions are met: (1) two stations have the same beginning hop number, and (2) both these stations want to transmit.

User Station Components

FIG. MM-3 shows the components of a user modem 150 and a computer 160. In a transmission mode, the computer 160 generates a packet of any protocol and the modem puts it in Cellular IP packets and the modem 150 transmits the packets. In a receiving mode, the modem 150 receives Cellular IP packets and strips of the Cellular IP information off of it and sends it to the computer 160 that processes the packets.

The modem 150 includes a radio frequency (RF) unit 154, antenna "indoor or outdoor" 155 and a baseband-to-intermediate frequency (BIF) unit 153. The RF unit 154 may be modular for inexpensive configuration for a desired operating frequency. Contemplated frequencies include MMDS at 2.6 GHz; LMDS at both 28 and 29 GHz; ISM at all three of 902-928 MHz, 2.4 GHz and 5.7 GHz; ITFS; MDS; and other private frequencies.

The BIF unit 158 converts the baseband information from the computer 160 into intermediate frequency information for processing by the RF unit 154. The link between the modem 150 and the computer 160 may be a serial cable, parallel cable, SCSI cable, Ethernet or universal serial bus cable.

Although the present invention has been described with reference to a "modem" and a "computer," with increasing miniaturization it is contemplated that similar principles may be applied to an integrated device similar to today's existing cellular telephones and personal digital assistants. Furthermore, it is envisioned that the present invention may also apply to the conversion and transmission of analog data (e.g., voice) as well as digital data.

ISP Station Equipment

FIG MM-4 shows the base station configuration. The base station 109 has a GPS antenna 113, a GPS unit 112, RF unit 111 and a computer motherboard 110. The base GPS "Global Positioning Satellite Receiver" 112 and 113 are used to allow base stations to have a common timing reference.

FIG. MM-1 shows the configuration of three cells, cell #1, cell #2 and cell #3, which all use GPS "Global Positioning Satellite" 100 to establish a common reference between the three base stations so at time t1 from the satellite cell #1 uses frequency F1 and cell #2 uses frequency F2 and cell #3 uses frequency F3, at time t2 from the satellite the frequencies are reshuffled as shown in table #1 of FIG. MM-1, and so on.

FIG. MM-5 shows a satellite time frequency plan for the three base stations. This features allows our base stations to reuse frequencies in adjacent cells and further improve the utilization of the frequency spectrum.

In a given cell, such as cell #1 in Fig. MM-1, the modems remain synchronized to the base transmitting station 101 because the base transmitting station 101 transmits a synchronization burst periodically. This synchronization burst helps the modems of cell #1 to follow the carrier hops of the base transmission station 101 in cell #1 because the modems have determined from their programmed firmware which carrier

frequencies the base transmission station 101 will hop to by extracting it from the synchronization burst of the base transmission station 101.

Coded Frequency Spectrum

In the network architecture described above, spread spectrum is employed to allow numerous cells to coexist in the same geographical space.

According to the invention a byte stream acts as codes given to the frequency bank controller to generate a unique spectrum associated with this byte based on a pre defined table of codes relating bytes to spectrums such as shown in Fig. 3.

The output of the frequency bank is then taken to a summing node to create a spectrum. For example, if a three bit byte comes in it will drive the bit0, bit1, bit2 and enable or disable the buffer to create or not to create a sin wave in the spectrum.

In the preferred embodiment, such as shown in Fig. 4, Bit0 to Bit7 are the byte stream input from the computer. Iout is the spectrum output to drive in the phase carrier. Q output is the spectrum output to drive the Q output of the quadrature carrier.

Any transmitter built using coded frequency spectrum modulation in a spread spectrum system, whether frequency hopping of direct sequences for wireless computer communications to create a cellular internet or a wide area network based or not based on cellular internet protocol, falls within the scope of the invention as well as coded frequency spectrum modulation used in wired computer communications whether spread spectrum or not.

Generally, an embodiment of the RF section of the code frequency spectrum modulation receiver is shown in Fig. 5. The antenna receives the signal and amplifies it. Then any out of band signal is filtered out and then mixed with hopping spread spectrum frequencies determined by a synthesizer, which exactly match the same order of the transmitter to generate IF output.

The demodulator stage is shown in Fig. 6. Additional stages of gain are needed to compensate for losses. The I/Q demod demodulates the IF into two spectrums, I code frequency spectrum modulation spectrum and Q code frequency modulation spectrum, respectively. The tone decoding phase locked loops decode the tone components of the code frequency spectrum modulation spectrums into original bits forming the bytes that originally generate the tones; then it is sent to the computer.

WHAT IS CLAIMED IS:

1. A cellular data packet, comprising:

a preamble for collision determination and synchronization;

a start-of-frame delimiter (SFD);

a destination address (DA);

a source address (SA);

a routing information block (RIB); and

an informational field.

2. The cellular data packet of claim 1, wherein said informational field comprises:

a type field for indicating whether said packet is a control packet or a service packet;

a status field;

a data field; and

a cyclic redundancy check (CRC) field, including error detection and correction information.

3. The cellular data packet of claim 2, wherein said type field comprises:

a two-byte protocol identifier;

a two-byte sub-protocol identifier; and

a two-byte service identifier.

4. The cellular data packet of claim 2, wherein said status field is configured to indicate whether said packet is an ACK or a NACK packet, the number of data packets pending, spread spectrum synchronization information, or whether said packet is native or routed.

5. The cellular data packet of claim 1, wherein said destination address comprises:

a region indicator for indicating a region location of a recipient user station;

a cell identifier for indicating a cell within said region; and

a cellular IP address of said recipient user station within said cell.

6. The cellular data packet of claim 1, wherein said source address comprises:

a region indicator for indicating a region location of a transmitting user station;

a cell identifier for indicating a cell within said region; and

a cellular IP address of said transmitting user station within said cell.

7. The cellular data packet of claim 1, wherein said routing information block indicates a routing path of said packet from said transmitting/receiving user station to said base station.

8. The cellular data packet of claim 7, wherein said routing information block is configured to indicate up to ten routing links between said transmitting station and said base station.

9. The cellular data packet of claim 1, wherein said packet is a variable-length data packet.

10. The cellular data packet of claim 9, wherein said packet has a maximum byte-length of 512 bytes.

11. A method for routing a data packet within an intelligent cellular IP network, wherein a transmitting/receiving station is outside of an originating transmitting or destination receiving cell or blocked from said originating transmitting or destination receiving cell, comprising the steps of:

transmitting a data packet, including routing information indicating at least one intermediate recipient other than a base station;

receiving of said packet by said at least one intermediate recipient; and

transmitting said packet in accordance with said routing information from said at least one intermediate recipient to said receiving base station;

wherein said at least one intermediate recipient is a different transmitting/receiving station within said cell.

12. The method of claim 11, wherein said routing information is determined from a routing table specific to each of said transmitting/receiving stations.

13. The method of claim 12, wherein said routing table can be static or dynamic.

14. A reduced collision cellular network for transmitting/receiving cellular IP data packets, comprising:

a plurality of cells distributed within said network, each of said cells associated with a certain frequency at a given time;

a base station located within each of said cells, configured to reshuffle said frequencies of adjacent cells according to a common timing reference and periodically transmit a synchronization burst to each of said plurality of cells; and

a plurality of user transmission/receiving stations located within each of said plurality of cells within said network, each of said user transmission/receiving stations

associated with a respective frequency hop number, wherein said transmission/receiving stations are configured to actively transmit/receive data packets if said associated frequency hop number is determined to be available, and wherein each of said user transmission/receiving stations within a respective one of said plurality of cells remain synchronized to said base station based upon said periodic synchronization burst.

15. The cellular network of claim 14, wherein the common timing reference is determined from a global positioning satellite.

16. An cellular modem, comprising:

a radio frequency unit for transmitting/receiving data packets; and

a baseband-to-intermediate frequency conversion unit, having a cellular network routing engine based on cellular IP, configured to covert the baseband information from a computer into intermediate frequency information for processing by said radio frequency unit;

wherein said modem is configured to serve as a router within said cellular network.

17. The cellular modem of claim 16, wherein said radio frequency unit is configured to operate in the MMDS, LMDS, ISM, ITFS and MDS spectrums.

ABSTRACT OF THE DISCLOSURE

An apparatus according to the present invention is a cellular IP modem that includes a baseband-to-intermediate frequency unit and a radio frequency unit. The baseband-to-intermediate frequency unit is configured to have a routing engine based on Cellular Internet Protocol. A method according to the present invention includes the steps of sending a data packet including routing information indicating an intermediate recipient other than a base station; receiving the packet at the intermediate recipient; and sending the packet in accordance with the routing information from the intermediate recipient to the base station. Additionally, a network architecture is described to support the creation of the Cellular IP network and its elements.

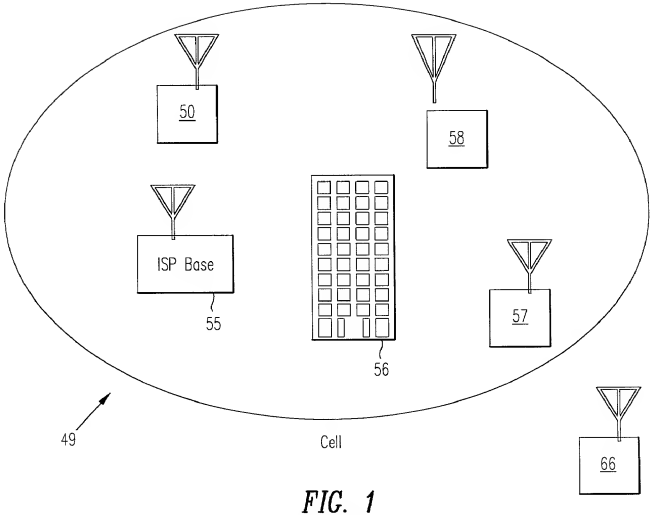
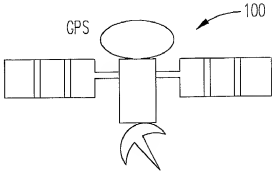


FIG. 1
(Prior Art)

7	1	9	9	110	6	6	360	4
Preamble	SFD	DA	SA	RIB	Type	Status	Data	CRC

FIG. 2



GPS is used for establishing reference.

Frequency used is Time Multiplexed.

Time	Frequency	Cell
T1	F1	Cell #1
	F2	Cell #2
	F3	Cell #3
T2	F2	Cell #1
	F3	Cell #2
	F1	Cell #3

Table #1

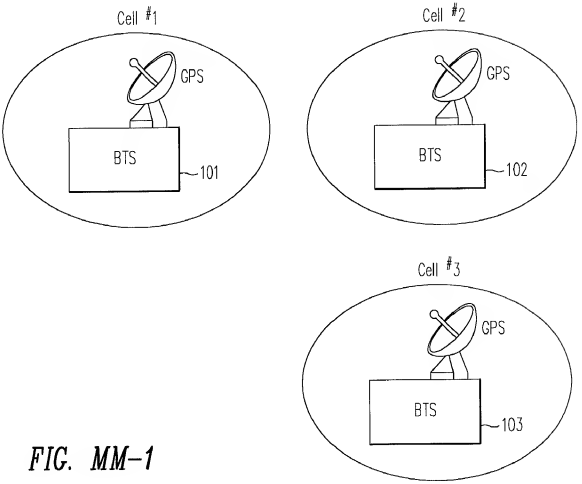


FIG. MM-1

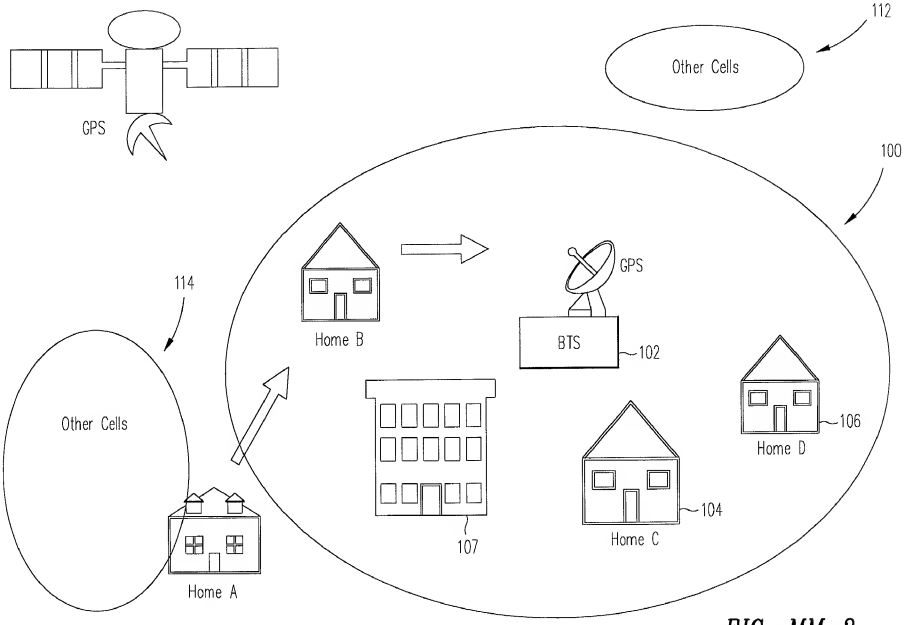

GPS
112
Other Cells
100
114
Other Cells
Home B
GPS
BTS
102
106
Home D
107
104
Home C
Home A

FIG. MM-2

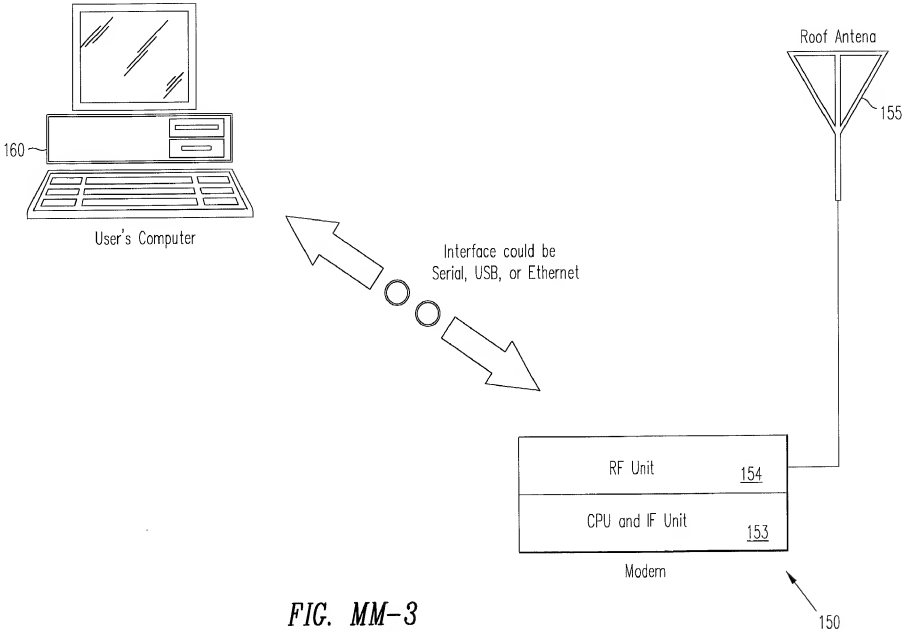


FIG. MM-3

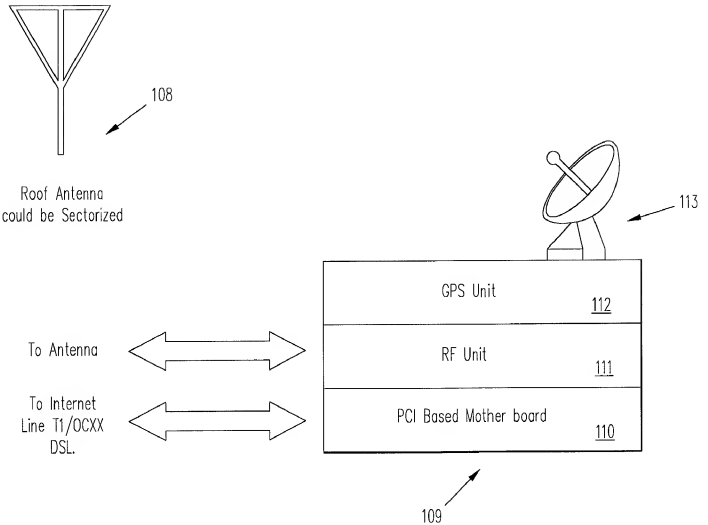

108
Roof Antenna
could be Sectorized
113
GPS Unit
112
RF Unit
111
PCI Based Mother board
110
To Antenna
To Internet
Line T1/OCXX
DSL.
109

FIG. MM-4

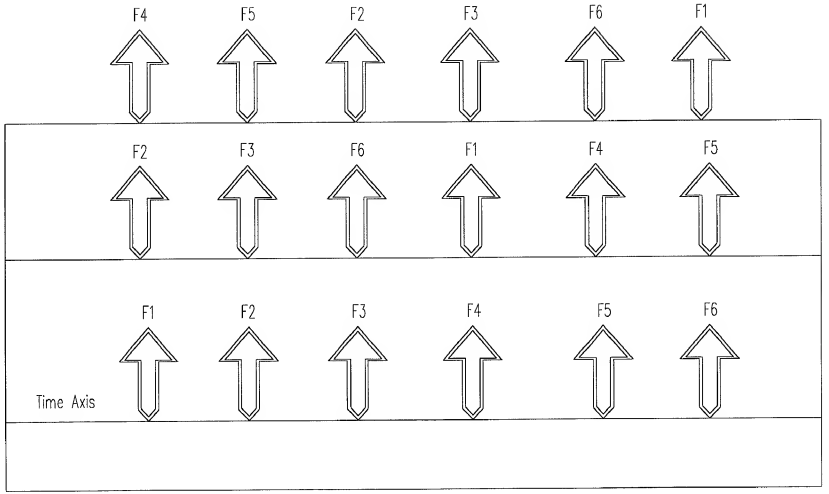


FIG. MM-5

Byte Stream split to two nibbles in Hex	SPECTRUM for I	Spectrum for Q	
0	F5	F4 + F5 + F1	
1	F1	F1 + F5 + F2	
2	F2	F1 + F2 + F4	
3	F3	F3 + F2 + F4	
4	F4	F3 + F1 + F2	
5	F1 + F2	F2 + F4	
6	F1 + F3	F2 + F3	
7	F1 + F4	F1 + F4	
8	F2 + F3	F1 + F3	
9	F2 + F4	F1 + F5	
A	F3 + F1 + F2	F1 + F2	
B	F3 + F1 + F4	F4	
C	F3 + F2 + F4	F3	
D	F1 + F2 + F4	F2	
E	F1 + F5 + F2	F1	
F	F4 + F5 + F1	F5	
Example:			
byte stream		I	Q
0	5	F5	F2 + F4
a	0	F3 + F1 + F2	F4 + F5 + F1
f	1	F4 + F5 + F1	F1 + F5 + F2
3	3	F3	F3 + F2 + F4
5	7	F1 + F2	F1 + F4
3	b	F3	F4

Table 1

FIG. 3

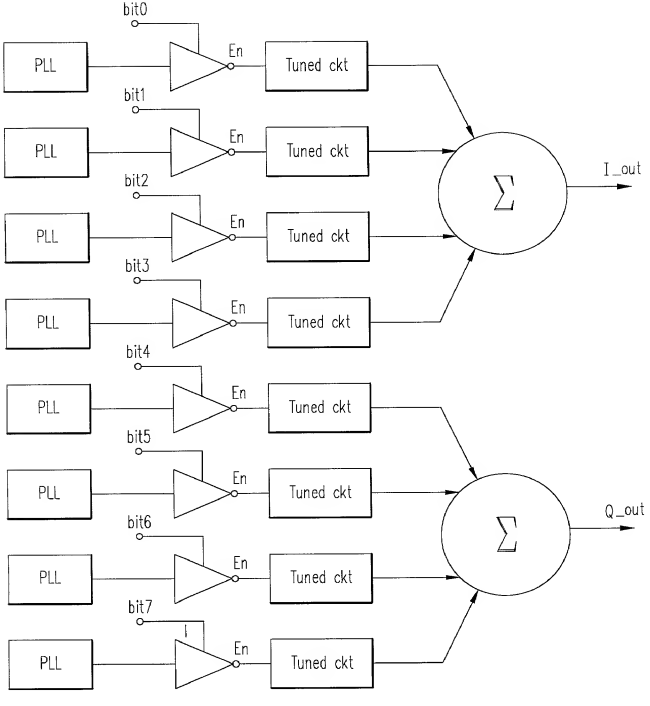

bit0
PLL
En
Tuned ckt
bit1
PLL
En
Tuned ckt
bit2
PLL
En
Tuned ckt
bit3
PLL
En
Tuned ckt
bit4
PLL
En
Tuned ckt
bit5
PLL
En
Tuned ckt
bit6
PLL
En
Tuned ckt
bit7
PLL
En
Tuned ckt
Σ
I_out
Σ
Q_out

FIG. 4

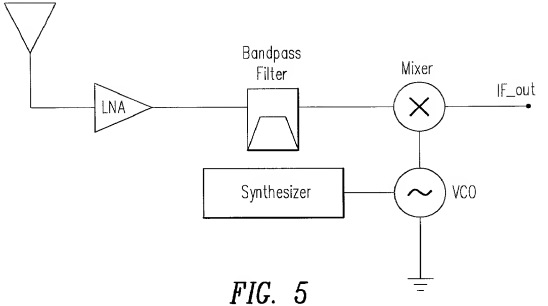

Bandpass
Filter
Mixer
LNA
IF_out
Synthesizer
VCO

FIG. 5

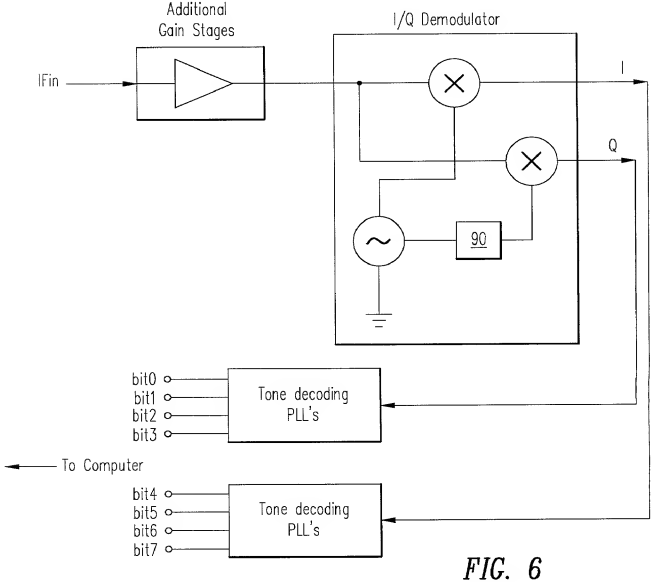

Additional
Gain Stages
I/Q Demodulator
IFin
I
Q
90
bit0
bit1
bit2
bit3
Tone decoding
PLL's
To Computer
bit4
bit5
bit6
bit7
Tone decoding
PLL's

FIG. 6

Atty Docket No. IHE-310USA

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

CELLULAR INTERNET PROTOCOL MODEM NETWORK

the specification of which (check one) _x_ is attached hereto or ___ was filed on ___ as Application No. ___ and was amended on ___ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR § 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed Yes	No
Number	Country	Day/Month/Year Filed	____	____
Number	Country	Day/Month/Year Filed	____	____

I hereby claim the benefit under 35 U.S.C. § 119(e) of any United States provisional application(s) below.

60/095,720	August 7, 1998
Application Number	Filing Date
60/140,717	June 22, 1999
Application Number	Filing Date

I hereby claim the benefit under 35 U.S.C. § 120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

PCT/US99/17793	Aug. 6, 1999	
Application Number	Filing Date	Status: Patented, Pending, Abandoned
Application Number	Filing Date	Status: Patented, Pending, Abandoned

I HEREBY APPOINT THE FOLLOWING AS MY ATTORNEYS WITH FULL POWER OF SUBSTITUTION TO PROSECUTE THIS APPLICATION AND TRANSACT ALL BUSINESS IN THE PATENT OFFICE CONNECTED THEREWITH:

Karl A. Limbach	18,689	Stephen M. Everett	30,050	Cameron A. King	41,897
George C. Limbach	19,305	Alfred A. Equitz	30,922	Kyla L. Harriel	41,816
John K. Uilkema	20,282	Charles P. Sammut	28,901	Mayumi Maeda	40,075
Neil A. Smith	25,441	Mark C. Pickering	36,239	Michael R. Ward	38,651
Veronica C. Devitt	29,375	Patricia Coleman James	37,155	Roger S. Sampson	44,314
Ronald L. Yin	27,607	Kathleen A. Frost	37,326	Charles L. Hamilton	42,624
Gerald T. Sekimura	30,103	Alan A. Limbach	39,749	Andrew V. Smith	43,132
Michael A. Stallman	29,444	Douglas C. Limbach	35,249	Eric N. Hoover	37,355
Philip A. Girard	28,848	Seong-Kun Oh*		J. Thomas McCarthy	22,420
Michael J. Pollock	29,098	* Recognition under 37 CFR 10.9(b)		Joel G. Ackerman	24,307

Send correspondence to Limbach & Limbach L.L.P.
Attn: George C. Limbach
2001 Ferry Building
San Francisco, CA 94111
Telephone: 415/433-4150

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Ihab H. Elzind

Inventor's signature _____ 6-5-00
Date

Residence San Jose, California

Citizenship United States

Post Office Address 6347 Paso Los Cerritos, San Jose, CA 95120

Full name of second joint inventor, if any, _____

Inventor's signature _____
Date

Residence _____

Citizenship _____

Post Office Address _____